

What is Claimed is:

1           1. A coordinatable system of inclined  
2           geosynchronous satellite orbits, comprising:

3           3        a plurality of satellite positions  
4           4        representing the maximum number of satellites that may  
5           5        be included in the coordinatable system of inclined  
6           6        geosynchronous satellite orbits to achieve optimum  
7           7        satellite coverage during a specified period within a  
8           8        specified service area;

9           9        each satellite position being located in one  
10           10      of a plurality of satellite orbits forming one of a  
11           11      plurality of families of satellite orbits;

12           12      each of the plurality of satellite orbits  
13           13      within any one of the plurality of families of  
14           14      satellite orbits defining an orbital plane having a  
15           15      unique inclination with respect to the equatorial  
16           16      plane of the Earth and with respect to the orbital  
17           17      plane of any other one of the plurality of satellite  
18           18      orbits within the same family of satellite orbits;

19           19      the plurality of satellite orbits within any  
20           20      one of the plurality of families of satellite orbits  
21           21      having identical apogees;

22           22      loci of subsatellite points repeatedly  
23           23      traced upon the surface of the Earth by a straight  
24           24      line extending from the center of the Earth to an  
25           25      orbiting satellite position generating an imaginary  
26           26      ground track on the surface of the Earth;

27           27      the ground track traced by orbiting  
28           28      satellite positions within any one of the plurality of  
29           29      families of satellite orbits defining an area  
30           30      therewithin that differs from the area defined within  
31           31      the ground track traced by orbiting satellite

32 positions within any other family of satellite orbits;  
33 the ground tracks being mutually and  
34 generally symmetrically nested about a first longitude  
35 of symmetry to form a first set of ground tracks; and  
36 the satellite positions within each of the  
37 plurality of families of satellite orbits being  
38 coordinated with each other and being further  
39 coordinated with the satellite positions to achieve a  
40 minimum specified angular separation between  
41 satellites occupying the plurality of satellite  
42 positions and using the same frequencies.

1 2. The system of claim 1, wherein the  
3 eccentricity of each satellite orbit is high enough  
4 with respect to the inclination thereof so that a  
5 ground track traced by orbiting satellite positions  
6 within each family of satellite orbits does not cross  
itself.

1 3. The system of claim 2, wherein each of  
2 the plurality of satellite orbits is configured to  
3 position the maximum latitude of the ground track  
4 traced by orbiting satellite positions within each  
5 family of satellite orbits at a specified longitude.

1 4. The system of claim 3, wherein the  
2 satellites in each of the plurality of families of  
3 satellite orbits are coordinated so that they are  
4 equally spaced in time.

1 5. The system of claim 4 further including  
2 a plurality of additional satellite positions to  
3 generate at least a second set of ground tracks

4 disposed at at least a second longitude of symmetry.

6. A method of providing a coordinatable system of inclined geosynchronous satellite orbits, the method comprising:

specifying at least one geographic service  
within which satellite coverage is to be provided.

specifying a period during which satellite coverage is to be optimized;

defining a plurality of families of satellite orbits, each satellite orbit defining the path of a satellite position, each satellite orbit in each of the plurality of families of satellite orbits defining an orbital plane having a unique inclination with respect to the equatorial plane of the Earth and with respect to the orbital plane of any other one of the plurality of satellite orbits within the same family of satellite orbits, the plurality of satellite orbits within any one of the plurality of families of satellite orbits having identical apogees, loci of subsatellite points repeatedly traced upon the surface of the Earth by a straight line extending from the center of the Earth to an orbiting satellite position generating an imaginary ground track on the surface of the Earth, the ground track traced by orbiting satellite positions within any one of the plurality of families of satellite orbits defining an area therewithin that differs from the area defined within the ground track traced by orbiting satellite positions within any other family of satellite orbits.

configuring each satellite orbit in each of the plurality of families of satellite orbits so that the ground tracks are mutually and generally

32       symmetrically nested about a first longitude of  
33       symmetry to form a first set of ground tracks;

34           determining a maximum number of satellites,  
35       and thus of satellite orbits, that may be included in  
36       each of the plurality of families of satellite orbits  
37       and determining the shape and geographic position of  
38       each ground track to achieve minimum specified angular  
39       separation between satellite positions using the same  
40       frequencies and to achieve optimum satellite coverage  
41       during the specified period in the at least one  
42       service area specified; and

43           coordinating the position of satellites in  
44       satellite orbits in accordance with the determined  
45       maximum number of satellite positions and the minimum  
46       specified angular separation therebetween.

1       7. The method of claim 6, wherein the step  
2       of defining a plurality of families of satellite  
3       orbits, each orbit defining the path of a satellite  
4       position, further includes selecting an eccentricity  
5       for each satellite orbit that is high enough with  
6       respect to the inclination thereof so that a ground  
7       track traced by orbiting satellite positions within  
8       each family of satellite orbits does not cross itself.

1       8. The method of claim 7, following the  
2       step of determining a maximum number of satellites,  
3       further including the step of configuring each of the  
4       plurality of satellite orbits to position the maximum  
5       latitude of the ground track traced by orbiting  
6       satellite positions within each family of satellite  
7       orbits at a specified longitude.

1                   9. The method of claim 8, wherein the step  
2 of coordinating the placement of satellites in  
3 satellite orbits further includes phasing the  
4 satellites in each of the families of satellite orbits  
5 so that they are equally spaced in time.

1                   10. The method of claim 9, following the  
2 step of configuring each of the plurality of satellite  
3 orbits to position the maximum latitude of the ground  
4 track traced by orbiting satellite positions within  
5 each family of satellite orbits at a specified  
6 longitude, further including the step of including  
7 additional satellite positions to generate at least a  
8 second set of ground tracks disposed at at least a  
9 second longitude of symmetry.